



Environmental Protection Agency  
An Ghníomhaireacht um Chaomhnú Comhshaoil

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23 March 2012

W0129-03

re: Notice in accordance with Article 16(1) of the Waste Management (Licensing) Regulations

Dear Ms Rooney

I am to refer to the above referenced application for a waste licence relating to a facility at Hollywood Great, Nags Head, The Naul, County Dublin. The Agency is giving detailed consideration to the application and to complete this task the following information, particulars and evidence are required in accordance with Article 16(1) of the Regulations.

Please provide complete answers to each question.

### **ARTICLE 16(1) - FURTHER INFORMATION, PARTICULARS AND EVIDENCE**

1. With regard to the notification made to the Health and Safety Authority (Appendix B.8.1 of the application), provide a copy of any response received and any further correspondence and outline any actions taken on foot of such correspondence.
2. Clarify whether the estimate of "Total (over life of site)" of 1,511,000 tonnes per Table H.1(c) of the application includes waste already deposited in the landfill. Similarly, clarify whether the total waste acceptance in Table H.1(c), 6,865,125 tonnes, includes waste already deposited.
3. **Leachate and rainwater management**
  - 3.1. It is proposed that leachate collection systems will be kept separate to avoid recirculating leachate to the wrong cell type. Explain why, how and under what circumstances leachate will be recirculated in each of the three classes of landfill.
  - 3.2. State whether any hazardous waste proposed for deposition has leachate generating potential in its own right. Or, is rainwater infiltration the only source of leachate in the hazardous cells?
  - 3.3. State what will be done with surplus leachate from the hazardous cells that is not utilised in the solidification process.
  - 3.4. A leachate detection layer is proposed and drawing WLA\_22\_02 indicates a 250mm pipe with a junction into the body of the landfill liner. Provide a more detailed



diagram of the leak detection system, particularly its base, showing its design, the purpose of the junction in to the granular stabilisation layer of the liner, how it will be constructed and how it is proposed to detect, sample and pump leachate.

3.5. It is stated that temporary covers "will be installed on the hazardous cells, as required, in order to minimise leachate generation."

- a) Explain "as required".
- b) Describe the objective, design, construction, operation, maintenance and decommissioning of the proposed temporary covers.
- c) Clarify whether the covers will be permanently in place as covered storage areas or whether the cover will only be applied at night and on Sundays.
- d) A covered temporary storage area and a temporary cover are mentioned on pages 6 and 46 respectively of the Hydrogeological Quantitative Risk Assessment. Clarify whether these are the same as the temporary covers referred to above.

3.6. Explain what circumstances could result in an increased head of leachate in the DAC-lined and other cells and the mitigation measures in place to prevent this occurring and in the event that it does occur.

#### 4. Solidification process

4.1. Provide an outline of operational experiences at the Indaver reference plant in Antwerp (mentioned in section H.3 of the application), including:

- a) the mixing ratios, materials and curing periods used in treating flue-gas treatment residues and how these parameters are determined;
- b) the storage arrangements for solidified waste awaiting final deposit in landfill cells;
- c) the frequency of solidified waste testing;
- d) the analysis of flue-gas treatment residues (including leaching tests) before and after treatment by solidification;
- e) the nature and composition of landfill leachate obtained from cells containing the solidified waste.

4.2. State whether any process tests have been carried out on flue-gas treatment residues generated in Ireland and whether it is possible to draw parallels between the Belgian experience and the proposed activity in terms of, *inter alia*, the list in item 4.1 above.

4.3. Provide a reference for the "current guidance" referred to in paragraph H.3.22 of the application.

#### 5. LandSim model

5.1. The Hydrogeological Quantitative Risk Assessment refers to a number of appendices (including A1.1, A1.2, A1.3, A3.1, A3.2, A3.3, A3.4, A4.1, A4.2, A4.3 and A4.4) that do not appear to be included in the application. Please indicate their location in the documentation already submitted or provide a copy of the documents. (It may be appropriate to provide these documents in electronic format).

5.2. Justify whether Landsim is appropriate to use for a site having exposed bedrock, a high water table and a fractured aquifer system directly beneath the proposed landfill development. Although Landsim is considered necessary for evaluating a landfill site

- generally, the results of the LandSim model should be combined with a more sophisticated numerical groundwater (contaminant transport) model, to consider the regional context and risk or justify why this is not appropriate.
- 5.3. It is stated that a period of 35 years for a management control period is conservative. In section 8.3.4.4 of the Hydrogeological Quantitative Risk Assessment it is stated: "The model assumes that after this period there is no leachate management and leachate head can rise within the cells resulting in greatly increased leakage."
- a) Explain how it follows in relation to the claims made for the DAC liner that increased head of leachate will result in increased leakage.
  - b) Describe the predicted/modelled effect of increasing the maximum leachate head in table 8.5 of the Hydrogeological Quantitative Risk Assessment for non-hazardous and hazardous cells to 2m and 5m.
- 5.4. Rainfall and infiltration
- a) Demonstrate that the data for Dublin Airport is adequately representative of the site given the different topography and elevation and taking into account the risk of underestimating site specific infiltration rates used in the LandSim model.
  - b) Justify not applying a further conservative factor to rainfall given these factors.
- 5.5. On page 59 of the Hydrogeological Quantitative Risk Assessment, it is stated that "of those contaminants potentially present in leachate at the site, only cadmium and mercury are classed as hazardous substances." State the source of this finding and explain the apparent rationale behind the thinking that no other hazardous substances will be present in the leachate.
- 5.6. Provide further information on the assumptions and justification behind selection of the model leachate inventory and initial leachate concentrations. There appears to be no justification/discussion on which potential contaminants have/have not been progressed to risk assessment, only that they are "likely contaminants which may arise in leachate from the hazardous cell". More proposed-waste-streams-specific data should be obtained if possible (from say other similar sites or proposed source sites) to ensure the modelled suite of potential contaminants is comprehensive enough. Bench-scale testing of some of the more significant waste streams proposed may be appropriate to demonstrate that unacceptably high leaching is not going to happen.
- 5.7. Much of the hazardous waste deposited is not expected to degrade with time and therefore may be expected to act as a constant source of potential leaching in the long term. A declining source term has been used in the model. Provide further information on the rationale behind such a selection and the form of the declining source term used. This includes what kappa values have been used (linked to the rate of predicted contaminant release from the waste).
- 5.8. Provide greater justification for the use of marker chemicals for certain potential contaminants present within the leachate inventory but excluded from the model simply because of an absence of WAC data. Provide detailed information on the mobility and toxicity similarities between markers and the excluded contaminants they are supposed to represent, under the expected geochemical conditions within the landfill.
- 5.9. Provide greater justification for the use of a single clay mineral layer to represent the

proposed DAC liner system, in particular whether attenuation (adsorption) capacities are appropriate for the DAC system that is designed to act as a structural barrier.

- 5.10. Confirm whether the same vertical saturated pathway was used for all waste phases and cell types modelled relative to the varying pathway properties across the site as a whole, in both south to north, and east to west. Justify not using multiple models to provide a cell specific assessment.
- 5.11. Specifically, provide information on the vertical saturated pathway hydraulic conductivity values used within the model.
- 5.12. Refine the overall modelling exercise on foot of the items above and following any additional site investigations and improvement to the conceptual site model – see the following sections of this letter.

## 6. Conceptual Site Model

- 6.1. Develop further the conceptual site model to encompass the requirements of this notice as a whole. As well as explanatory text, this might result in a series of diagrams including:
  - a) A plan showing all site investigation to date (including additional investigations conducted as a result of this notice), and topographic detail extending beyond the licence boundary to the limits of the monitoring points;
  - b) A plan showing regional groundwater flow, based on measured water levels and including a more accurate depiction of the groundwater divide between the site and the Bog of the Ring;
  - c) Two separate plans, one showing local groundwater piezometry in the Namurian Formation and one showing it in the Loughshinny Formation;
  - d) A series of cross-sections (e.g. one N-S through the proposed waste cells, and two E-W through the proposed waste cells) that accurately show the geology derived from borehole logs and head gradients derived from monitored water levels in boreholes screened in different strata;
  - e) A conceptual site model diagram showing the proposed development superimposed on one or more of the above cross-sections.
- 6.2. More detailed analysis of existing data and information, where available, is required to improve the overall conceptual model for the site. For example:
  - a) Detailed geological log for Dunne Drilling borehole “5668” drilled in November 2008. From Table 14.3 (p.221) of the EIS it seems this borehole may be BH4A, which is available, and if so, confirm that the “black rock” described by Dunnes is in fact the Loughshinny Formation.
  - b) Boreholes BH1, BH2 and BH3 were presumably drilled on-site in the past and details about these (location, depth, borehole logs etc.) should be presented.
  - c) Appendix A14.4 states that borehole logs are not available for BH4, BH10 and BH11; however the 1999 EIS has a log for BH10. Review the overall findings of the application with this new information.

- d) Figures 14.2, 14.5 and 14.12 show most (not all) of the boreholes and trial pits that have been drilled or excavated on-site. Please provide this information all on one figure. The figure should include topographical detail for the area as a whole (including national grid coordinates), including the area beyond the licence boundary (where off-site monitoring wells and water courses are located).
- 6.3. Provide separate figures showing the shallow (Namurian) and deeper (Loughshinny) groundwater flow regimes. Also present groundwater flow in a regional context on a detailed figure including site and off-site data, householder/farm wells and the Bog of the Ring water supply wells and trial wells (Figure 12 of the Hydrogeological Quantitative Risk Assessment only shows the local site groundwater flow regime).

## **7. Geology, hydrology and hydrogeology**

- 7.1. Any further analysis of the impact on groundwater should utilise vulnerability and aquifer classifications using GSI guidelines. This refers specifically to the claim that the Namurian bedrock at the site can be interpreted as low permeability subsoil for the purpose of groundwater vulnerability mapping. Bedrock is not subsoil and cannot necessarily be used in this way. Also, it is not clear that the Namurian bedrock has low permeability in the first place. If it is believed that site specific circumstances allow the aquifer to be considered differently, there is need for much more site specific information on the bedrock units beneath the site, as set out in detail in this notice.
- 7.2. Since the bases of the proposed landfill cells are expected to be only 2m above the current water table in places, more consideration of past, current and potential future water levels and abstraction scenarios linked to the Bog of the Ring water supply scheme is required. Illustrate the effect of the abstraction on groundwater piezometry and potential for change in the (yet to be fully characterised) groundwater divide between the site and the Bog of the Ring.
- a) For example, this requires analysis of groundwater level data for the MEHL site area prior to commencement of pumping at the Bog of the Ring (water level data is available in the 1999 EIS) as well as in the more recent past.
  - b) It also requires consideration of the impact of (a) increased abstraction and (b) reduced abstraction (there being evidence of reduced yields) from the active waste supply wells possibly leading to groundwater rebound beneath the proposed landfill cells.
  - c) In addition, more regional groundwater level data is required (for example, this might include local domestic well water levels, Bog of the Ring pumping/monitoring/trial well water levels, water level data from the Fingal County Council EIS, or the installation of additional wells to the north of the MEHL site).
  - d) If insufficient off-site wells are found to exist to define the groundwater divide location, particularly if fault controlled preferential groundwater movement to the north is an important factor, then this should be addressed.

- 7.3. Provide data that proves the upward head gradient currently depicted between the Loughshinny Formation and overlying Namurian Formation in Figure 13 ("Schematic Conceptual Model") of the Hydrogeological Quantitative Risk Assessment. The groundwater level data presented in the EIS suggests there may be an upward head gradient in the north-east of the site, but there appears to be a downward head gradient for the majority of the rest of the site, including where the proposed landfill cells are located. The installation and monitoring of well pairs (each one of a pair screened either in Namurian or Loughshinny Formations) in the areas where landfill cells are proposed appears to be the only way to accurately prove the issue of head gradients (see item 8 below).
- 7.4. Illustrate on an appropriate map or drawing the location and course of the stream referred to as being 1.5km to the east of the site and hydraulically connected to the site via groundwater.

## **8. Additional site investigations**

In order to improve the landfill site element of the CSM, additional site investigation is expected to be carried out. It is expected that there should be groundwater monitoring wells within the footprint of each of the proposed landfill cells. Specifically:

- 8.1. Where both Namurian and Loughshinny bedrock exist, well pairs are needed (comprising one well screened in Namurian and one in the Loughshinny Formations). Where one suitable well already exists the second can be installed close to it (within 5m).
- 8.2. Such well pairs are expected to be needed within each of four fault blocks created by the N-S fault and E-W fault that transect the site, allowing better assessment of groundwater flow across fault structures and between the Namurian and Loughshinny, and consideration of potential flow along fault zones during pump testing. As the proposed hazardous waste cell is located across all fault blocks and in an area where both formations exist (Namurian over Loughshinny), this will be the likely main area of focus.
- 8.3. There is also a need for good well data for the proposed non-hazardous waste cells and new inert cell. In some of the southern area (southwest quadrant) there appears to be insufficient well points, although, as only the Loughshinny is present only single well points are needed. Where it cannot be demonstrated to the EPA's satisfaction that suitable monitoring wells already exist then additional ones are needed.
- 8.4. Because pump test data may suggest flow along the fault zone (from our review) there is a need to have a well pair at the north end of the proposed hazardous waste cell on the line of the main N-S fault zone.
- 8.5. As part of preparation for the additional investigation programme consideration should be given to the benefit of undertaking coring of certain boreholes and downhole geophysical logging to maximise understanding of lithology, fracture distribution and orientation, etc.
- 8.6. A 7-day pump test and associated step test and recovery test should be carried out. (For such a complex site a 2-day test is too short). It is also suggested that the suitability of BH17 as a pump test well should be reconsidered, and a new well (or a packer in BH17) potentially installed so that the pump test only draws water from the Loughshinny Formation. This will allow better interpretation of the main aquifer zone and the hydraulic connectivity to the overlying Namurian.

8.7. If the further assessment of off-site (down gradient) groundwater levels do not provide conclusive evidence of the location of the groundwater divide between the site and the Bog of the Ring abstraction scheme, then some off-site drilling may be required to address this data gap in the CSM.

**9. Other matters**

9.1. Provide a description of any works carried on at the facility where the details of these works have not previously been submitted in the application or further information to the Agency. The information should include additional drawings as appropriate.

9.2. Provide any additional environmental monitoring information which has been obtained but not previously forwarded to the Agency as part of the application. An assessment of the results should also be provided.

In the case where any drawings already submitted are subject to revision consequent on this request for further information, a revised drawing should be prepared in each case. It is not sufficient to annotate the original drawing with a textual correction. Where such revised drawings are submitted, provide a list of drawing titles, drawing numbers and revision status, which correlates the revised drawings with the superseded versions.

Your reply to this notice should include a revised non-technical summary (EIS and Application Form), which reflects the further information you supply in compliance with the notice, insofar as that information impinges on the relevant non-technical summary.

Please supply the information in the form of a one original plus two copies within 12 weeks of the date of this notice. In addition submit sixteen copies of the requested information to the Agency in electronic searchable PDF format on CD-ROM. Please note that all maps/drawings should not exceed A3 in size.

Please note that the application's register number is **W0129-03**. Please direct all correspondence in relation to this matter to *Administration, Environmental Licensing Programme, Office of Climate, Licensing & Resource Use, Environmental Protection Agency, PO Box 3000, Johnstown Castle Estate, County Wexford* quoting the register number.

Yours sincerely,



Brian Meaney  
Inspector  
Office of Climate, Licensing & Resource Use